B5

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/759,789	01/11/2001	Aaftab Munshi	500497.01	2852

27076 7590 05/03/2004

DORSEY & WHITNEY LLP
INTELLECTUAL PROPERTY DEPARTMENT
SUITE 3400
1420 FIFTH AVENUE
SEATTLE, WA 98101

EXAMINER	
MCCARTNEY, LINZY T	

ART UNIT	PAPER NUMBER
2671	7

DATE MAILED: 05/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/759,789	MUNSHI ET AL.	
	Examiner	Art Unit	
	Linzy McCartney	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 2/17/04.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-27 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-27 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 22 is rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,175,368 to Aleksic et al. (Aleksic).

a. Referring to claim 22, Aleksic discloses a gradient mapping circuit (Fig. 1) to calculate for each pixel a representative of a displacement vector having first and second perpendicular components the first component equal to the product of a first vector tangent to the surface at the pixel, a first scale factor, and a first displacement component along the first vector and the second component equal to the product of a second vector tangent to the surface at the pixel, a second scale factor, and a second displacement component along the second vector (column 4, lines 15-21; column 5, lines 25-35; Fig. 6; column 9, lines 50-53; Fig. 7; column 5, 25-35; column 4, lines 15-21).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-9, 11, 13-15, 17-20, 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blinn, "Simulation of Wrinkled Surfaces" (Blinn) in view of Aleksic.

a. Referring to claim 1, Blinn teaches adding a displacement vector to the interpolated normal vector to produce a perturbed normal vector (page 287, column 1, paragraph 2 and column 2, paragraph 2) and generating color values for the pixel based on the perturbed normal vector instead of the interpolated normal vector (page 288, paragraph 3). Blinn does not explicitly disclose the displacement vector calculated from the equation: D = (fu * Pu * scaleu) + (fv * Pv * scalev), where D is the displacement vector, Pu and Pv are perpendicular vectors tangent to the surface function at the pixel, fu and fv are displacement values along Pu and Pv, respectively and scaleu and scalev are scaling values. Aleksic discloses a displacement value calculated from the equation D = (fu * Pu * scaleu) + (fv * Pv * scalev) (column 4, lines 15-21; column 5, lines 25-35), where D is the displacement vector (column 4, lines 24-27; Fig 6), where Pu and Pv are perpendicular vectors tangent to the surface function at the pixel (Fig. 6; column 9, lines 50-53), fu and fv are displacement values along Pu and Pv, respectively (Fig. 7); and scaleu and scalev are scaling values (column 5, 25-35; column 4, lines 15-21). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the method of Blinn by calculating the displacement using the equation D = (fu * Pu * scaleu) + (fv * Pv * scalev) as taught by Aleksic. The suggestion/motivation for doing so would have been because it would allow bump

mapping to be determined on a pixel by pixel basis without the computational overhead of prior bump mapping techniques (Aleksic, column 4, lines 30-35).

b. Referring to claim 2, Blinn discloses wherein Pu, Pv, the perturbed normal vector, and the displacement vector comprise three coordinate vectors (page 287, column 2, paragraph 2).

c. Referring to claim 3, Blinn discloses normalizing the perturbed normal vector (page 288, column 1, paragraph 3).

d. Referring to claim 4, Blinn discloses wherein fu and fv represent partial derivatives of a function defining a texture applied to the surface (page 287, column 1, paragraph 2 – column 2, paragraph 1).

e. Referring to claim 5, Blinn discloses wherein fu and fv comprise bilinearly filtered values (page 288, column 2, paragraph 1).

f. Referring to claim 6, Blinn discloses calculating the color values for the pixel based on a perturbed normal vector having a displacement from the interpolated normal vector (Abstract; page 287, column 1, paragraph 2 and column 2, paragraph 2). Blinn does not explicitly disclose the displacement is equal to a first vector tangent to the surface at the location of the pixel scaled by a first scale factor and a first displacement value or a second vector tangent to the surface at the location of the pixel and scaled by a second scale factor and a second displacement value, the second vector perpendicular to the first vector. Aleksic discloses the displacement is equal to a first vector tangent to the surface at the location of the pixel scaled by a first scale factor and a first displacement value and a second vector tangent to the surface at the location of the pixel and scaled by

a second scale factor and a second displacement value, the second vector perpendicular to the first vector (column 4, lines 15-21; column 5, lines 25-35; Fig. 6; column 9, lines 50-53; Fig. 7; column 5, 25-35; column 4, lines 15-21).

g. Referring to claim 7, Blinn discloses normalizing the perturbed normal vector (page 288, column 1, paragraph 3).

h. Referring to claim 8, Blinn discloses wherein the first and second displacement values comprise values representative of partial derivatives for a first and second variable, respectively, of a function defining a texture applied to the surface (page 287, column 1, paragraph 2 – column 2, paragraph 1).

i. Referring to claim 9, Blinn discloses wherein the first and second displacement values comprise bilinearly interpolated values (page 288, column 2, paragraph 1).

j. Referring to claim 11, Blinn discloses determining a normal vector for a pixel having a location along a surface (page 287, column 1, paragraph 2); adding a displacement vector to the normal vector to produce a perturbed normal vector (page 287, column 2, paragraph 2) and calculating color values for the pixel based on the perturbed normal vector instead of the normal vector (page 288, paragraph 3). Blinn does not explicitly disclose the displacement vector is calculated from the sum of a first vector tangent to the surface at the location of the pixel scaled by a first scale factor and a first displacement component, and a second vector perpendicular to the first vector and tangent to the surface at the location of the pixel and scaled by a second scale factor and a second displacement component. Aleksic discloses the displacement vector is calculated from the sum of a first vector tangent to the surface at the location of the pixel scaled by a

first scale factor and a first displacement component, and a second vector perpendicular to the first vector and tangent to the surface at the location of the pixel and scaled by a second scale factor and a second displacement component (column 4, lines 15-21; column 5, lines 25-35; Fig. 6; column 9, lines 50-53; Fig. 7; column 5, 25-35; column 4, lines 15-21).

k. Referring to claim 13, Blinn discloses normalizing the perturbed normal vector (page 288, column 1, paragraph 3).

l. Referring to claim 14, Blinn discloses wherein the first and second displacement components comprise values representative of partial derivatives for a first and second variable, respectively, of a function defining a texture applied to the surface (page 287, column 1, paragraph 2 – column 2, paragraph 1).

m. Referring to claim 15, Blinn discloses wherein the first and second displacement components comprise bilinearly interpolated values (page 288, column 2, paragraph 1).

n. Referring to claim 17, Blinn discloses calculating a perturbed normal vector displaced from a norm vector normal to the surface at the location of the pixel by a displacement vector (page 287, column 1, paragraph 2 and column 2, paragraph 2), however Blinn does not explicitly disclose a circuit for performing the aforementioned calculations nor does Blinn disclose the displacement vector equal to the sum of a first vector tangent to the surface at the pixel scaled by a first scale factor and a first displacement component and a second vector tangent to the surface at the pixel and scaled by a second scale factor and a second displacement component, the second vector perpendicular to the first vector. Aleksic discloses a circuit performing the

aforementioned calculations (Fig. 1) and the displacement vector equal to the sum of a first vector tangent to the surface at the pixel scaled by a first scale factor and a first displacement component and a second vector tangent to the surface at the pixel and scaled by a second scale factor and a second displacement component, the second vector perpendicular to the first vector (column 4, lines 15-21; column 5, lines 25-35; Fig. 6; column 9, lines 50-53; Fig. 7; column 5, 25-35; column 4, lines 15-21).

o. Claims 18-20 are rejected with the rationale of the rejections of claims 7-9 respectively.

p. Claim 23 is rejected with the rationale of the rejection of claim 17. Claim 23 recites the additional limitations of a system processor, a system bus coupled to the system processor, a system memory coupled to the system bus, a display, and a graphics processing system coupled to the system bus for calculating color values having a location along a surface and providing graphics data to the display. Aleksic discloses the aforementioned limitations (Abstract, Fig. 1).

q. Claims 24-26 are rejected with the rationale of the rejections of claims 7-9 respectively.

3. Claims 10, 16, 21, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blinn in view of Aleksic as applied to claims 6, 11, 17, and 22 above further in view of "Learning Alias Level One" (Alias).

a. Referring to claim 10, Blinn does not explicitly disclose wherein first and second scale factors comprise unequal values. Alias discloses wherein first and second scale factors comprise unequal values (page 206, sections 9-10 and Figure). At the time the

invention was made, it would have been obvious to a person of ordinary skill in the art to further modify the method of Blinn by having the first and second scale factors comprise unequal values as taught by Alias. The suggestion/motivation for doing so would have been because it would give the user greater control over the appearance of the bump map texture.

b. Referring to claim 16, Blinn does not explicitly disclose wherein first and second scale factors comprise unequal values. Alias discloses wherein first and second scale factors comprise unequal values (page 206, sections 9-10 and Figure). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to further modify the method of Blinn by having the first and second scale factors comprise unequal values as taught by Alias. The suggestion/motivation for doing so would have been because it would give the user greater control over the appearance of the bump map texture.

c. Claim 21 is rejected with the rationale of the rejection claim 16.

d. Claim 27 is rejected with the rationale of the rejection claim 16.

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Blinn in view of Aleksic as applied to claim 11 above further in view of Foley et al, "Computer Graphics: Principles and Practice" (Foley).

a. Referring to claim 12, Blinn does not explicitly disclose wherein the surface corresponds to a polygon having vertices and determining a normal vector for the pixel comprises interpolating the normal vector from first and second normal vectors normal to the surface at locations corresponding to first and second vertices of the polygon. Aleksic

discloses wherein the surface corresponds to a polygon having vertices (column 4, lines 47-50; Fig. 2). Foley discloses determining a normal vector for the pixel comprises interpolating the normal vector from first and second normal vectors normal to the surface at locations corresponding to first and second vertices of the polygon (page 738, paragraph 1; Fig. 16.20). At the time the invention was made, it would have been obvious to one of ordinary skill in the art to further modify the teachings of Blinn by interpolating the normal vector from first and second normal vectors normal to the surface as taught by Foley. The suggestion/motivation for doing so would have been because it would reproduce highlights more faithfully and it allows highlights to be located at a polygon's interior (Foley, page 738, paragraph 2).

Response to Arguments

5. Applicant's arguments filed 2/17/04 have been fully considered but they are not persuasive. Applicant argues that the cited references fail to disclose calculating a displacement vector using the equation: D = (fu * Pu * scaleu) +(fv * Pv *scalev). In particular, Applicant argues that the parameters used in the equation disclosed in Aleksic patent are not the same as the aforementioned displacement equation. However, Aleksic discloses a displacment vector (Fig. 6, note delta N;) equal to perpendicular vectors tangent to the surface (Fig. 6, note B_u and B_v; column 9, lines 50-54) multiplied by displacement values along the perpendicular vectors tangent to the surface and scaling vectors (Fig. 7, note f_u and f_v; column 4, line 5-14).

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Linzy McCartney** whose telephone number is **(703) 605-0745**. The examiner can normally be reached on Mon-Friday (8:00AM-5: 30PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Mark Zimmerman**, can be reached at **(703) 305-9798**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

ltm
Wednesday April 21, 2004

MARK ZIMMERMAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600